MultiModem® Cell

Wireless Modem

MTCBA-H3-U1

User Guide

MultiTech® Systems

MultiModem® Cell User Guide
Wireless Modem
MTCBA-H3-U1
Part Number S000512E, Revision E

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Revision History

Revision	Date	Description
A	10/17/2011	Initial release.
B	1/04/2013	Updated RoHS and other regulatory information.
C	1/31/2013	Removed EV1 model information.
D	4/30/2013	Updated specifications.
E	1/6/2014	UL translations

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To create an account and submit a Support Case on the Portal, visit https://support.multitech.com

Online Web Portal https://support.multitech.com
The Knowledge Base provides immediate answers to your questions and gives you access to support resolutions for all Multi-Tech products. Visit our support area on the website for other support services.

Knowledge Base and Support Services www.multitech.com/support.go

World Headquarters
Multi-Tech Systems, Inc.
2205 Woodale Drive
Mounds View, Minnesota 55112
Phone: 763-785-3500 or 800-328-9717
Fax: 763-785-9874

Technical Support
Business Hours: M-F, 9am to 5pm CST

Country	By Email	By Phone
Europe, Middle East, Africa:	support@multitech.co.uk	+(44) 118 959 7774
U.S., Canada, all others:	support@multitech.com	(800) 972-2439 or (763) 717-5863

Warranty
To read the warranty statement for your product, visit: http://www.multitech.com/warranty.go

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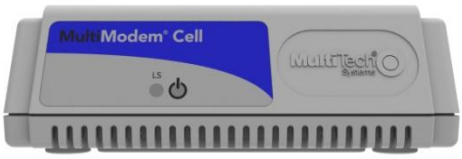
Chapter 1 – Product Description and Specifications

Product Description

The Multi-Tech MultiModem® Cell cellular modems are ready-to-deploy, standalone modems that provide wireless data communication and integrate seamlessly with virtually any application. The MultiModem Cell cellular modem is based on industry-standard open interface and uses Multi-Tech's Universal Socket design.

The Cell modem is designed with a quad-band GSM/GPRS/HSPA network. The modems include a USB interface. If desired, you can mount the modem on a flat surface, such as a desktop or panel.



Model	Description
MTCBA-H3-U1	The MTCBA-H3-U1 wireless modem offers fast cellular data speeds by using HSPA technology. The modem is equipped with quad-band technology and can be used on all existing GSM networks, and most HSPA networks.

Related Documentation

MultiModem MTCBA-H3-U1

Use the HSPA-H3 AT commands to configure the MTCBA-H3-U1 modem. These commands are documented in the HSPA-H3 AT Commands Reference Guide part number S000505x.

Safety

General Safety

The modem is designed for and intended to be used in fixed and mobile applications. Fixed means the device is physically secured at one location and cannot be easily moved to another location. Mobile means the device is used in other than fixed locations.

CAUTION: Maintain a separation distance of at least 20 cm (8 inches) between the transmitter's antenna and the body of the user or nearby persons. The modem is not designed for or intended to be used in portable applications within 20 cm of the user's body.

Check your local standards regarding safe distances, etc.

ATTENTION: Maintenir une distance d'au moins 20 cm (8 po) entre l'antenne du récepteur et le corps de l'utilisateur ou à proximité de personnes. Le modem n'est pas conçu pour, ou destinés à être utilisés dans les applications portables, moins de 20 cm du corps de l'utilisateur.

Vérifiez vos normes locales touchant les distances de sécurité, etc..

RF Safety

Due to the possibility of radio frequency (RF) interference, it is important that you follow any special regulations regarding the use of radio equipment. Follow the safety advice given below.

- Operating your device close to other electronic equipment may cause interference if the equipment is inadequately protected. Observe any warning signs and manufacturers' recommendations.
- Different industries and businesses restrict the use of cellular devices. Respect restrictions on the use of radio equipment in fuel depots, chemical plants, or where blasting operations are in process. Follow restrictions for any environment where you operate the device.
- Do not place the antenna outdoors.
- Switch OFF your wireless device when in an aircraft. Using portable electronic devices in an aircraft may endanger aircraft operation, disrupt the cellular network, and is illegal. Failing to observe this restriction may lead to suspension or denial of cellular services to the offender, legal action, or both.
- Switch OFF your wireless device when around gasoline or diesel-fuel pumps and before filling your vehicle with fuel.
- Switch OFF your wireless device in hospitals and any other place where medical equipment may be in use.

Sécurité RF

En raison de la possibilité d'interférences de radiofréquence (RF), il est important que vous suiviez une quelconque réglementation concernant l'utilisation du matériel radio. Suivez les conseils de sécurité ci-dessous.

- Fonctionnement de votre appareil à proximité d'autres appareils électroniques peuvent causer des interférences si l'équipement est insuffisamment protégé. Respectez les panneaux d'avertissement et les recommandations du fabricant.
- Différentes industries et les entreprises limitent l'utilisation des appareils cellulaires. Respectez les règlements sur l'utilisation des équipements radio dans les dépôts de carburant, les usines chimiques, ou lorsque des opérations de dynamitage sont en cours. Suivez restrictions pour n'importe quel environnement où vous utilisez l'appareil.
- Ne pas placer l'antenne à l'extérieur.
- Éteignez votre appareil sans fil dans un avion. Utilisant des dispositifs électroniques portables dans un avion peut mettre en danger le fonctionnement de l'avion, peut perturber le réseau cellulaire, et est illégal. Le non-respect de cette restriction peut entraîner la suspension ou le refus des services cellulaires au contrevenant, une action en justice, ou les deux.
- Éteignez votre appareil sans fil lorsque autour de l'essence ou pompes diesel-carburant et avant de remplir votre véhicule avec du carburant.
- Éteignez votre appareil sans fil dans les hôpitaux et tout autre endroit où l'équipement médical peut être utilisé.

Vehicle Safety

When using your device in a vehicle:

- Do not use this device while driving.
- Respect national regulations on the use of cellular devices in vehicles.
- If incorrectly installed in a vehicle, operating the wireless device could interfere with the vehicle's electronics. To avoid such problems, use qualified personnel to install the device. The installer should verify the vehicle electronics are protected from interference.
- Using an alert device to operate a vehicle's lights or horn is not permitted on public roads.

Device Maintenance

When maintaining your device:

- Do not attempt to disassemble the device. There are no user serviceable parts inside.
- Do not expose your device to any extreme environment where the temperature or humidity is high.
- Do not expose the device to water, rain, or spilled beverages. It is not waterproof.
- Do not place the device alongside computer discs, credit or travel cards, or other magnetic media. The information contained on discs or cards may be affected by the device.
- Using accessories, such as antennas, that Multi-Tech has not authorized or that are not compliant with Multi-Tech's accessory specifications may invalidate the warranty.
- If the device is not working properly, contact Multi-Tech Technical Support.

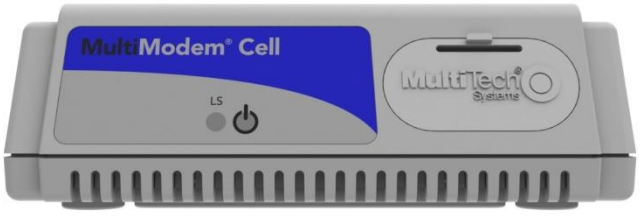
Handling Precautions

To avoid damage due to the accumulation of static charge, use proper precautions when handling any cellular device. Although input protection circuitry has been incorporated into the devices to minimize the effect of static build-up, use proper precautions to avoid exposure to electronic discharge during handling and mounting the device.

Front Panel Overview

The front panel includes an LED that indicates the status of the link. Another LED indicates whether the modem has power.

The SIM door on the right side of the modem provides access to the SIM card holder if needed.



LEDs

LS	When lit, indicates the radio module has power.
PWR	When lit, the unit is receiving power from the USB connection.

Package Contents

Note: For the MTCBA-H3-U1 modem, your wireless provider supplies the SIM card.

Unbundled Package without Accessories

1 modem

Note: You must supply mounting screws, USB cable, and an antenna.

Bundled Package with Accessories

1 modem

1 antenna

USB cable

Note: You must supply mounting screws

Specifications

Category	Description
General	
Performance	HSPA
Frequency Bands	Quad band 850/900/1800/1900 MHz
Speed	
Packet Data[1]	HSDPA data service of up to 7.2 Mbps HSUPA data service of up to 5.76 Mbps
Circuit Switched Data	IS-95A, IS-95B up to 14.4K bps forward and reverse
SMS	
SMS	Text & PDU, Point-to-Point, Cell broadcast
Connectors	
RF Antenna Connector	50 ohm SMA (female connector)
SIM Connector	Standard 1.8 and 3V SIM receptacle
USB Connector	Type B
Power Requirements	
Voltage	5.0V USB input voltage supplied by USB connector
Physical Description	
Dimensions (L x W x H)	2.89 in x 4.75 in x 1.58 in 7.34 cm x 12.06 cm x 4.01 cm
Weight (Device only)	0.32 lbs 0.147 Kg
Environment	
Operating Temperature[2] (verified tested temp)	-22° to 158° F -30° to 70° C
Storage Temperature	-40°to 185° F -40° to 85° C
Humidity	Relative humidity 20%-90% noncondensing

Certifications, Compliance	
EMC Compliance	FCC Part 15 Class B EN55022 Class B EN55024
Radio Compliance	FCC Part 22, 24 RSS132, 133 EN301 489-1 EN301 489-7 EN301 489-24
Safety Compliance	UL/cUL 60950-1 2nd Ed IEC60950-1 2nd Ed am.1
Network Compliance	PTCRB, AT&T

[1]Actual performance speeds may be affected by a variety of attributes such as cell tower distance, data loads, position of the sun, wind speeds, packet sizes, etc.

[2] UL Listed at 40° C, limited by power supply. UL Certification does not apply or extend to an ambient above 40° C and has not been evaluated by UL for ambient greater than 40° C. “UL has evaluated this device for use in ordinary locations only. Installation in a vehicle or other outdoor locations has not been evaluated by UL. UL Certification does not apply or extend to use in vehicles or outdoor applications or in ambient above 40° C.”

Répertorié UL à 40° C, limitée par la puissance d'alimentation. Certification UL ne s'appliquent ni s'étendre à l'une température ambiante supérieure à 40° C et n'a pas été évalué par UL pour ambiante supérieure à 40° C. «UL a évalué cet appareil pour une utilisation dans des endroits ordinaires seulement. Installation dans un véhicule ou d'autres emplacements en plein air n'a pas été évaluée par UL. La certification UL ne s'applique pas ou s'étendre à utiliser dans des véhicules ou les applications en extérieur ou dans ambiante dépasse 40 ° C.»

Chapter 2 – Activating and Installing the Modem

Activating Your Wireless Account

To activate your wireless account:

1. Go to Multi-Tech's Cellular Activation website at http://www.multitech.com/activation.go.
2. From the **Select Your Product** drop-down list, select the model of your modem.
3. Follow the directions on the notice.

Determining the Phone Number for the Wireless Modem

Every wireless modem has a unique phone number. Your wireless service provider may give you this number. Or the number may be on the SIM card. Wireless provider implementations may vary.

Inserting the SIM Card for GSM Network Operation

The MultiModem requires the power supply connection to begin operation. The MTCBA-H3-U1 modem also requires a SIM card (Subscriber Identity Module) to operate on a GSM network.

To install the SIM:

1. Before you change the SIM, remove power from the unit.
2. To open the SIM door, press down on the tab on the top of the door and pry open the door.
3. Insert the SIM card into the card holder. The following illustration shows the correct SIM card orientation.

4. Verify that the SIM card fits into the holder properly and then close the door.

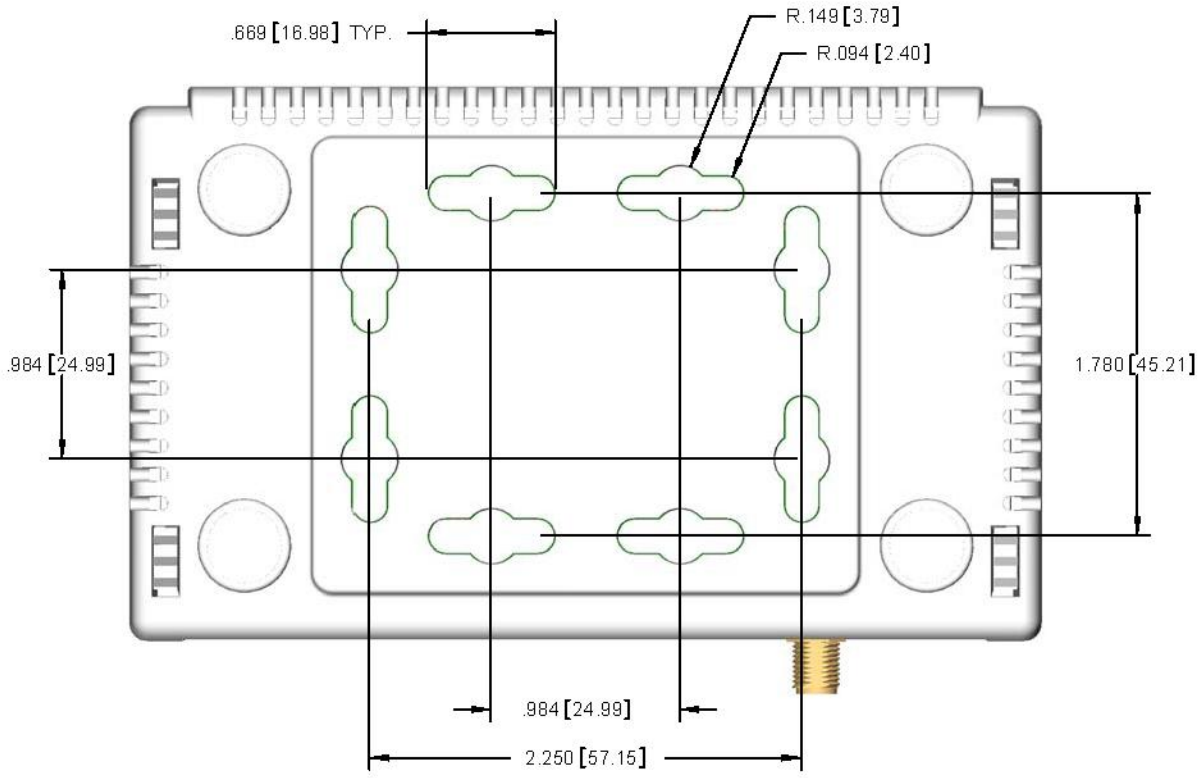
Connecting the Antenna and USB Cable

1. Connect a suitable antenna to the ANT connector.
2. The USB cable uses 500mA from the USB power line. Connect one end of the USB cable to your computer or other USB high power device, such as a hub. Connect the other end to the modem USB connector.

Mounting the Modem on a Flat Surface

You can mount the modem on a flat surface, if desired. To properly place mounting screws, use the measurements shown in the illustration that follows.

Use #6 pan head screws for all mount locations.

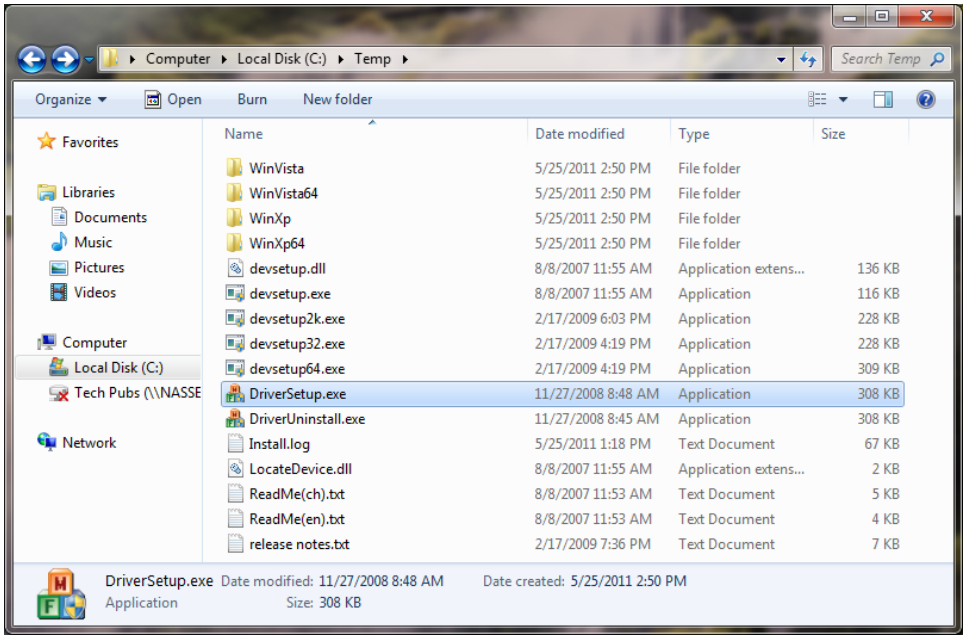


ALL DIMENSIONS IN INCHES [mm]

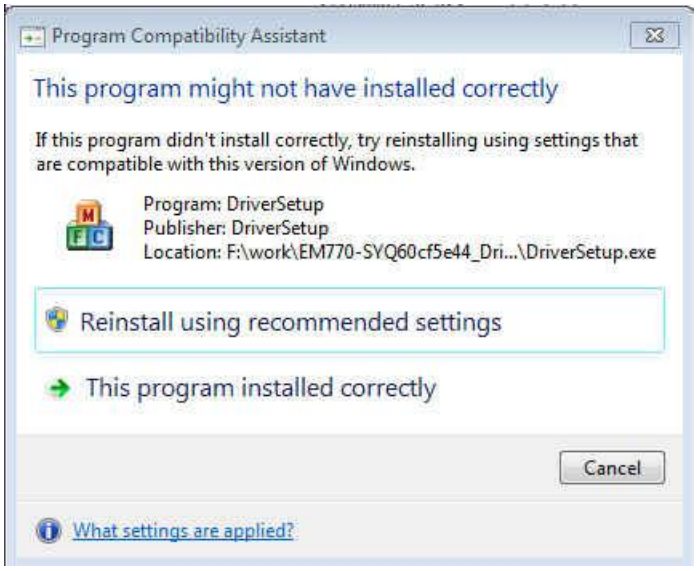
Installing the Huawei Driver

The following instructions help you install the Huawei driver for a computer using the Windows 7 operating system. Computer operating systems can differ. As such, you may need to modify the instructions in this section to allow for your computer's unique setup. Use these steps as a guideline to install the driver for all Windows operating systems.

1. From the Multi-Tech website, download drivers to a folder on your local PC.
2. From this folder, select **DriverSetup.exe** file.

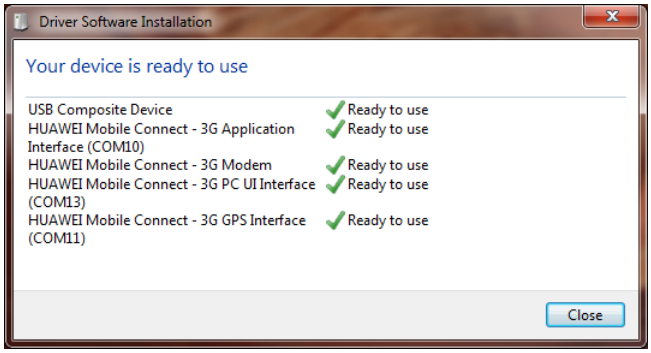

Computer ▸ Local Disk (C:) ▸ Temp ▸
Search Temp
Organize
Open
Burn
New folder
Favorites
Libraries
Documents
Music
Pictures
Videos
Computer
Local Disk (C:)
Tech Pubs (\\NASSE
Network
Name
Date modified
Type
Size
WinVista 5/25/2011 2:50 PM File folder
WinVista64 5/25/2011 2:50 PM File folder
WinXp 5/25/2011 2:50 PM File folder
WinXp64 5/25/2011 2:50 PM File folder
devsetup.dll 8/8/2007 11:55 AM Application extens... 136 KB
devsetup.exe 8/8/2007 11:55 AM Application 116 KB
devsetup2k.exe 2/17/2009 6:03 PM Application 228 KB
devsetup32.exe 2/17/2009 4:19 PM Application 228 KB
devsetup64.exe 2/17/2009 4:19 PM Application 309 KB
DriverSetup.exe 11/27/2008 8:48 AM Application 308 KB
DriverUninstall.exe 11/27/2008 8:45 AM Application 308 KB
Install.log 5/25/2011 1:18 PM Text Document 67 KB
LocateDevice.dll 8/8/2007 11:55 AM Application extens... 2 KB
ReadMe(ch).txt 8/8/2007 11:53 AM Text Document 5 KB
ReadMe(en).txt 8/8/2007 11:53 AM Text Document 4 KB
release notes.txt 2/17/2009 7:36 PM Text Document 7 KB
DriverSetup.exe Date modified: 11/27/2008 8:48 AM Date created: 5/25/2011 2:50 PM
Application Size: 308 KB

3. The Program Compatibility Assistant window appears.


Program Compatibility Assistant
This program might not have installed correctly
If this program didn't install correctly, try reinstalling using settings that are compatible with this version of Windows.
Program: DriverSetup
Publisher: DriverSetup
Location: F:\work\EM770-SYQ60cf5e44_Dri...\DriverSetup.exe
Reinstall using recommended settings
This program installed correctly
Cancel
What settings are applied?

4. Select **This program installed correctly**.
5. Plug the USB cable into the PC.

6. When the Driver Software Installation window states “Your device is ready to use”, your modem is installed.


Driver Software Installation
Your device is ready to use
USB Composite Device
Ready to use
HUAWEI Mobile Connect - 3G Application Interface (COM10)
Ready to use
HUAWEI Mobile Connect - 3G Modem
Ready to use
HUAWEI Mobile Connect - 3G PC UI Interface (COM13)
Ready to use
HUAWEI Mobile Connect - 3G GPS Interface (COM11)
Ready to use
Close

Verifying That Your Modem is Properly Installed

1. After you have successfully installed the MultiModem driver, you return to the **Phone and Modems Options** window. Make sure that the modem is now listed under the column **Modem** and **Attached To** (the correct com port).
2. Select the modem and then click **Properties**.
3. A **Properties** window opens for the Multi-Tech modem. Click the **Diagnostics** tab.

   In the middle of the window, click **Query Modem**. Windows queries the Multi-Tech modem. If the query is successful a group on the tab appears, showing the columns **Command** and **Response**.
4. If this process passes, your modem is properly installed and ready for use. To close the Properties window, click **OK**.
5. To close the Phone and Modems Options window, click **OK**.

Chapter 3 – Using the Wireless Modem

Using AT Commands to Verify Signal Strength and Roaming Status

You can use AT commands to operate, configure, and query your modem. Reference guides document the AT commands. You can download these guides from the Multi-Tech website.

To verify signal strength and roaming status, you must use a terminal application such as HyperTerminal. To open this program in Windows XP, go to **Start > All Programs > Accessories > Communications > HyperTerminal**. Other Windows operating systems have similar paths to HyperTerminal. See your system's online Help if you cannot find HyperTerminal.

Verifying Signal Strength

To verify signal strength:

1. Open a terminal program of your choosing.
2. Type **AT+CSQ**

   The modem responds with the received signal strength (rssi) and the channel bit error rate (ber).

   RSSI ranges from 0 to 31.

Signal Strength Verification – RSSI	
AT+CSQ xx Values	**Signal Strength**
0 - 10	Weak or Insufficient
11 - 20	Average
21 – 31	Exceptional
99	No signal

   BER ranges from 0 to 7 (Seven is the highest error rate).

Checking Network Registration and Roaming Status

To verify that the MultiModem is registered on the wireless network:

1. Open HyperTerminal.
2. Type **AT+CREG?**

The modem responds in one of the following ways:

Network Registration Verification	
Value	**Network Registration Status**
0,0	The modem is not registered on any network If not registered, verify the signal strength. The received signal might not be strong enough for the modem to register.
0,1	The modem is registered on the home network.
0,5	The modem is registered on a network and it is roaming.

Checking the Modem's Identity

Use the **ATI** command. This command uses the capital letter I (not L) after **AT**.

- Type **ATI0.** The command ends in a zero.

  The manufacturing data displays, for example: Huawei Modem Multiband G850 1900

- Type **ATI3**

  The software version displays, for example: 651_09gg...

Connecting to the Internet

You configure Internet access in Windows Dial-Up Networking (DUN) of the computer that the MultiModem Cell is serving.

For a GPRS network, create an Access Point Name in the Phone and Modem Options dialog in Windows Control Panel and then create your Windows Dial-Up Connection (DUN).

The following instructions help you configure the connection for a computer using the Windows 7, Windows Vista and Windows XP operating systems. Computers can differ. As such, you may need to modify the instructions in this section to allow for your computer's unique setup. Use these steps as a guideline to set up an Internet connection through your wireless service provider for all operating systems.

Connecting to an GSM/GPRS/HSPA Network for Internet Access

After you insert the SIM card and complete all other setup steps, establish an Internet connection through a Windows dial-up session.

Before You Begin

- Make sure you have one HSPA capable MultiModem cell modem.
- The MultiModem modem has a HSPA capable network and an active SIM card.
- The modem must receive a proper signal and have network registration through the wireless provider's network.
- Install the Multi-Tech drivers on a computer running Windows 7, Vista or XP.

Setting the Access Point Name (APN) for MTCBA-H3-U1

So your MTCBA-H3-U1 modem can connect to your provider's network, set the modem's APN. The APN is a server name that your account is setup on with your provider. You provider gives you the APN. Some APNs include:

- AT&T; PROXY, or INTERNET, or PUBLIC
- T-Mobile: INTERNET2. VOICESTREAM.COM, INTERNET3.VOICESTREAM.COM, EPC.Tmobile.com or WAP.VOICESTREAM.COM

To set the APN:

1. From the **Start** button, select **Control Panel**.
2. In Control Panel, double-click **Phone and Modem Options**.
3. In the **Phone and Modem Options** window, click the **Modems** tab. Highlight your Cell modem listed in the table and then click **Properties**.
4. A **Properties** window for your modem opens. For Windows Vista and later operating systems, click **Change Settings**.
5. Click the **Advanced** tab.
6. From the **Extra Settings** group, in the Extra initialization commands text box, enter:
   a. AT+CGDCONT=1,"IP","<APN>"
   b. For <APN>, enter in the correct APN for your account.
      For example: AT+CGDCONT=1"IP","ISP.AT&T"
7. To close the Properties window, click **OK**.
8. To close the Phone and Modems Options window click **OK**.

Creating a Dial-Up Connection in Windows Vista and XP

1. From the **Start** button, select **Control Panel**.
2. In the Control Panel, double click N**etwork Connections**.
3. From the Network Connections window, in the **Network Tasks** group, click **Create a new connection**.
4. The New Connection Wizard opens, and steps you through the setup of an Internet connection. To begin, click **Next**.
5. On the Network Connection Type pane, select **Connect to the Internet**. Click **Next**.
6. On the Getting Ready pane, select **Set up my connection manually**. Click **Next**.
7. On the Internet Connection pane, select **Connect using a dial-up modem**. Click **Next**.
   After clicking Next, you may be asked to select which modem to use. If you have more than one modem installed in your computer, select the proper Multi-Tech wireless modem.
8. On the Connection Name pane, in the ISP Name box, type in a name for your new connection. Use any name you desire, then click **Next**.
9. On the Phone Number to Dial pane, type the number that the modem can use to connect to your provider's Internet service.
   - For HSPA modems, type in the number ***99***1#**. Then click **Next**.
   - For EV-DO modems, type in the number **#777.** Then click **Next**.

10. On the Connection Availability pane, specify if this connection is for anyone's use or for your use only. Click **Next**.
11. On the Internet Account Information pane, type the user name and the password for your account. In many cases, a user name and a password are not required. However, some wireless providers require this information. Check with your provider to determine if the user name and password are required.
12. Check the following options if you want to active them:
    - Check the box if you want this account name and password to be used by everyone.
    - Check the box if you want this as your default Internet connection.
    - Click **Next**.
13. On the Completing the New Connection Wizard pane, indicate if you want to add a shortcut to your desktop. Click **Finish**.
14. A Connection window appears on your desktop. Click **Properties**.
15. The Properties window opens, where you can make your connection.

    Note: Make sure that **Use dialing rules** is not selected. Click **OK**.
16. Once back at the Connection window, to connect, click **Dial**.
17. The modem connects to your provider's Internet service. Once connected, the connection status icon appears in your system tray.

    You can open an Internet browser to access the Internet.

Creating a Dial-Up Connection in Windows 7

1. From the **Start** button, select **Control Panel**.
2. From the Adjust your computer's settings window, select **Network and Internet**.
3. From the Network and Internet window, select **Network and Sharing Center**.
4. In the window that appears, in the Change your networking settings group, select **Set up a new connection or network**.
5. In the Choose a connection option window, select **Set up a dial up connection**. Click **Next**.
6. In the window that appears, type the information about the connection that you received from your Internet service provider, including:

   Service provider

   Dial-up phone number

   User name

   Password

   Connection name
7. Click **Connect**.

Disconnecting

1. To disconnect, click on the connection icon in your system tray.
2. Right click on your current connection.
3. Select **Disconnect**. The modem disconnects from the Internet.

Using a Generic Dial-Up Method to Connect

Users of computers that are not running a Windows operating system can use a generic dial-up method to connect to the Internet.

1. To set up an Access Point Name (APN) enter:

   AT+CGDCONT=1,"IP","<APNSERVER>"

   where <APNSERVER> is the APN server supplied by your carrier.

2. Use **ATD*99***1#** to dial into the network.

Appendix A – Regulatory Compliance

EMC, Safety, and R&TTE Directive Compliance

CE

The CE mark is affixed to this product to confirm compliance with the following European Community Directives:

Council Directive 2004/108/EC of 31 December 2004 on the approximation of the laws of Member States relating to electromagnetic compatibility;

and

Council Directive 2006/95/EC of 12 December 2006 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits;

and

Council Directive 1999/5/EC of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

International Modem Restrictions

Some dialing and answering defaults and restrictions may vary for international modems. Changing settings may cause a modem to become non-compliant with national telecom requirements in specific countries. Also note that some software packages may have features or lack restrictions that may cause the modem to become non-compliant.

FCC Part 15 Class B Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Industry Canada

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Reglement Canadien sur le matériel brouilleur.

This device complies with Industry Canada RSS Appliance radio exempt from licensing. The operation is permitted for the following two conditions:

1. the device may not cause harmful interference, and
2. the user of the device must accept any interference suffered, even if the interference is likely to jeopardize the operation.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage, et
2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Appendix B - Cellular Information

Antenna System for Cellular Devices

Wireless performance depends on implementation and antenna design. The integration of the antenna system into the product is a critical part of the design process; therefore, it is essential to consider it early so performance is not compromised. If you make changes to the certified antenna system of the MultiModem, then recertification is required by specific network carriers such as Sprint. The antenna system is defined as the UFL connection point from the MultiModem to the specified cable specifications and specified antenna specifications.

FCC Requirements for the Antenna

The antenna gain, including cable loss, for the radio you are incorporating into your product design must not exceed the requirements at 850 MHz and 1900 MHz as specified by the FCC grant for mobile operations and fixed mounted operations as defined in 2.1091 and 1.1307 of the FCC rules for satisfying RF exposure compliance. The antenna used for transmitting must be installed to provide a separation distance of at least 20cm from all persons and must not transmit simultaneously with any other antenna transmitters. User and installers must be provided with antenna installation instructions and transmitter operating conditions to satisfying RF exposure compliance.

Antenna Specifications

CDMA/EVDO Antenna Requirements/Specifications

Frequency Range	824 – 894 MHz / 1850 – 1990 MHz
Impedance	50 Ohms
VSWR	VSWR shall not exceed 2.0:1 at any point across the bands of operation
Typical Radiated Gain	3 dBi on azimuth plane
Radiation	Omni-directional
Polarization	Vertical
TRP/TIS	The total radiated power (TRP) at the antenna shall be no less than +21/20 dBm for PCS/Cell channels respectively, and the total isotropic sensitivity (TIS) at the antenna shall be no less than -104/104 dBm for PCS/Cell channels respectively.

GSM/HSPA/GPRS Antenna Requirements/Specifications

Frequency Range	824 – 960 MHz / 1710 – 1990 MHz
Impedance	50 Ohms
VSWR	VSWR shall not exceed 2.0:1 at any point across the bands of operation
Typical Radiated Gain	3 dBi on azimuth plane
Radiation	Omni-directional
Polarization	Vertical
TRP/TIS	Including cable loss the total radiate power (TRP) at the antenna shall be no less than +22/24.5 dBm for 850/1900 MHz respectively, and the total isotropic sensitivity (TIS) at the antenna shall be no less than -99/101.5 dBm for 850/1900 MHz respectively.

PTCRB Requirements for the Antenna

Do not alter the authorized antenna system. The antenna system must maintain the same specifications. The antenna must be the same type, with similar in-band and out-of-band radiation patterns.

Antennas Available from Multi-Tech Systems, Inc.

Quad Band Description	**Qty**	**Part Number**
Hinged Right Angle 800/900/1800/1900 MHz Cellular Modem Antenna	1	ANQB-1HRA
Hinged Right Angle 800/900/1800/1900 MHz Cellular Modem Antenna	10	ANQB-10HRA
Hinged Right Angle 800/900/1800/1900 MHz Cellular Modem Antenna	50	ANQB-50HRA
Dual Band Description	**Qty**	**Part Number**
Hinged Right Angle 900/1800 MHz Cellular Modem Antenna	1	ANF1-1HRA
Hinged Right Angle 900/1800 MHz Cellular Modem Antenna	10	ANF1-10HRA
Hinged Right Angle 900/1800 MHz Cellular Modem Antenna	50	ANF1-50HRA
Hinged Right Angle 800/1900 MHz Cellular Modem Antenna	1	ANCF2-1HRA
Hinged Right Angle 800/1900 MHz Cellular Modem Antenna	10	ANCF2-10HRA
Hinged Right Angle 800/1900 MHz Cellular Modem Antenna	50	ANCF2-501HRA
Mag Mount Dual Band Description	**Qty**	**Part Number**
Mag Mount 900/1800 MHz 1/2 Wave Cellular Antenna, 12.5"	1	ANF1-1MMHW
Mag Mount 900/1800 MHz 1/2 Wave Cellular Antenna, 12.5"	10	ANF1-10MMHW
Mag Mount 900/1800 MHz 1/2 Wave Cellular Antenna, 12.5"	50	ANF1-50MMHW
Mag Mount 900/1800 MHz 1/4 Wave Cellular Antenna, 4"	1	ANF1-1MMQW
Mag Mount 900/1800 MHz 1/4 Wave Cellular Antenna, 4"	10	ANF1-10MMQW
Mag Mount 900/1800 MHz 1/4 Wave Cellular Antenna, 4"	50	ANF1-50MMQW
Mag Mount 850/1900 MHz 1/2 Wave Cellular Antenna, 12.5"	1	ANCF2-1MMHW
Mag Mount 850/1900 MHz 1/2 Wave Cellular Antenna, 12.5"	10	ANCF2-10MMHW
Mag Mount 850/1900 MHz 1/2 Wave Cellular Antenna, 12.5"	50	ANCF2-50MMHW
Mag Mount 850/1900 MHz 1/4 Wave Cellular Antenna, 4"	1	ANCF2-1MMQW
Mag Mount 850/1900 MHz 1/4 Wave Cellular Antenna, 4"	10	ANCF2-10MMQW
Mag Mount 850/1900 MHz 1/4 Wave Cellular Antenna, 4"	50	ANCF2-50MMQW

Appendix C – Environmental Information

Waste Electrical and Electronic Equipment Statement

WEEE Directive

The WEEE Directive places an obligation on EU-based manufacturers, distributors, retailers, and importers to take-back electronics products at the end of their useful life. A sister directive, ROHS (Restriction of Hazardous Substances) complements the WEEE Directive by banning the presence of specific hazardous substances in the products at the design phase. The WEEE Directive covers all Multi-Tech products imported into the EU as of August 13, 2005. EU-based manufacturers, distributors, retailers and importers are obliged to finance the costs of recovery from municipal collection points, reuse, and recycling of specified percentages per the WEEE requirements.

Instructions for Disposal of WEEE by Users in the European Union

The symbol shown below is on the product or on its packaging, which indicates that this product must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of their waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or where you purchased the product.

July, 2005

REACH Statement

Registration of Substances:

After careful review of the legislation and specifically the definition of an “article” as defined in EC Regulation 1907/2006, Title II, Chapter 1, Article 7.1(a)(b), it is our current view Multi-Tech Systems, Inc. products would be considered as “articles”. In light of the definition in § 7.1(b) which requires registration of an article only if it contains a regulated substance that “is intended to be released under normal or reasonable foreseeable conditions of use,” our analysis is that Multi-Tech Systems, Inc. products constitute nonregisterable articles for their intended and anticipated use.

Substances of Very High Concern (SVHC)

Per the candidate list of Substances of Very high Concern (SVHC) published October 28, 2008 we have reviewed these substances and certify the Multi-Tech Systems, Inc. products are compliant per the EU “REACH” requirements of less than 0.1% (w/w) for each substance. If new SVHC candidates are published by the European Chemicals Agency, and relevant substances have been confirmed, that exceeds greater than 0.1% (w/w), Multi-Tech Systems, Inc. will provide updated compliance status.

Multi-Tech Systems, Inc. also declares it has been duly diligent in ensuring that the products supplied are compliant through a formalized process which includes collection and validation of materials declarations and selective materials analysis where appropriate. This data is controlled as a part of a formal quality system and will be made available upon request.

Restriction of the Use of Hazardous Substances (RoHS)

Multi-Tech Systems, Inc.
Certificate of Compliance
2011/65/EU

Multi-Tech Systems confirms that its embedded products comply with the chemical concentration limitations set forth in the directive 2011/65/EU of the European Parliament (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment - RoHS)

These Multi-Tech products do not contain the following banned chemicals[1]:

- Lead, [Pb] < 1000 PPM
- Mercury, [Hg] < 1000 PPM
- Hexavalent Chromium, [Cr+6] < 1000 PPM
- Cadmium, [Cd] < 100 PPM
- Polybrominated Biphenyl, [PBB] < 1000 PPM
- Polybrominated Diphenyl Ether, [PBDE] < 1000 PPM

Environmental considerations:

- Moisture Sensitivity Level (MSL) =1

  Maximum Soldering temperature = 260C (in SMT reflow oven)

[1]Lead usage in some components is exempted by the following RoHS annex, therefore higher lead concentration would be found in some modules (>1000 PPM);

–Resistors containing lead in a glass or ceramic matrix compound.